

## 299-W11-88 (C5572) Log Data Report

### Borehole Information:

<b>Borehole:</b>		299-W11-88 (C5572)		<b>Site:</b>	ZP-1
<b>Coordinates (WA St Plane)</b>		<b>GWL<sup>1</sup> (ft):</b>	287	<b>GWL Date:</b>	12/18/07
<b>North (m)</b>	<b>East (m)</b>	<b>Drill Date</b>	<b>TOC Elevation</b>	<b>Total Depth (ft)</b>	<b>Type</b>
N/A <sup>2</sup>	N/A	12/07	N/A	490	Sonic/Air Rotary

### Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	3.6	N/A	8	N/A	3.6	20
Threaded steel	4.1	7	6 1/4	3/8	4.1	246
Threaded steel	4.5	6	5	1/2	4.5	436
Threaded steel	4.3	10 3/4	10	3/8	0.0	488

### Borehole Notes:

This borehole was drilled with the above casing configuration and completed December 13, 2007. Logging was conducted primarily in the single 5-in. casing from 243 to 438 ft on December 13. The logged interval from 436 to 438 ft was apparently below the 5-in. casing in open hole. Logging was again conducted December 17 primarily in the 6-in. casing from ground surface to 248 ft after the 5 and 8-in. casings had been removed from the borehole. The logged interval from 246 to 248 ft was apparently below the 6-in casing in open hole. On February 15, the driller reported depth to bottom, depth to water, and depth of casing. The borehole was drilled to a depth of 490 ft but casing ends at 488 ft leaving two feet of open hole into the basalt. This is the third log run for this borehole. All casing used to drill with the sonic rig were pulled and an air rotary drilled with 10" casing to total depth.

All drilling depths and casing depths were reported by the onsite geologist. The logging engineer measured the casing diameters with a caliper and steel tape. The depth to water was also measured by the logging engineer.

### Logging Equipment Information:

<b>Logging System:</b>	Gamma 1L		<b>Type:</b>	SGLS 60% HpGe
<b>Effective Calibration Date:</b>	07/09/07	<b>Calibration Reference:</b>	<b>Serial No.:</b>	47TP32211A
		<b>Logging Procedure:</b>	HGLP-MAN-002, Rev. 0	

### Spectral Gamma Logging System (SGLS) Log Run Information

Log Run	1	2 Repeat	3	4 Repeat
Date	12/13/07	12/13/07	12/17/07	12/17/07
Logging Engineer	Spatz	Spatz	Spatz	Spatz
Start Depth (ft)	438.0	266.0	248.0	96.0
Finish Depth (ft)	243.0	246.0	0.0	71.0
Count Time (sec)	100	100	100	100
Live/Real	R	R	R	R
Shield (Y/N)	N	N	N	N
MSA Interval (ft)	1.0	1.0	1.0	1.0
Pre-Verification	AL007CAB	AL007CAB	AL008CAB	AL008CAB
Start File	AL007000	AL007196	AL008000	AL008249
Finish File	AL007195	AL007216	AL008248	AL008274

**HGLP-LDR-215, Rev.0**

Log Run	1	2 Repeat	3	4 Repeat
Post-Verification	AL007CAA	AL007CAA	AL008CAA	AL08CAA
Depth Return Error (in.)	N/A	-2.5	-0.5	0
Comments	No fine gain adjustment made	No fine gain adjustment made	No fine gain adjustment made	No fine gain adjustment made

Log Run	5	6 Repeat		
Date	02/15/08	02/15/08		
Logging Engineer	Pearson/McClellan	Pearson/McClellan		
Start Depth (ft)	491.0	445.0		
Finish Depth (ft)	437.0	440.0		
Count Time (sec)	100	100		
Live/Real	R	R		
Shield (Y/N)	N	N		
MSA Interval (ft)	1.0	1.0		
Pre-Verification	AL020CAB	AL020CAB		
Start File	AL020000	AL020055		
Finish File	AL020054	AL020060		
Post-Verification	AL020CAA	AL020CAA		
Depth Return Error (in.)	N/A	0		
Comments	Fine gain adjustments made before -009	No fine gain adjustment made		

**Logging Operation Notes:**

Logging was conducted with a centralizer on the sonde. All measurements are referenced to ground surface.

**Analysis Notes:**

<b>Analyst:</b>	Henwood/Legler	<b>Date:</b>	01/15/08; 05/08/08	<b>Reference:</b>	GJO-HGLP 1.6.3, Rev. 0
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Pre- and post-run verifications for the logging system were performed before and after each day's data acquisition. The acceptance criteria were met.

A casing correction for a 3/8-in. thick casing was applied to the SGLS data from the ground surface to 246 ft (12/13/07-12/17/07 logging events) and from 437 to 488 ft (2/15/08 logging event). A casing correction for a 0.5-in. thick casing was applied to the data from 246 to 436 ft (12/13/07 logging event). No correction was applied to the apparent open hole data from 436 to 438 ft and from 246 to 248 ft and from 488 to 491 ft for log runs 1, 3, and 5 respectively.

Corrections for water inside the borehole were applied to data acquired below 287.4 ft according to calibration data.

SGLS spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated with EXCEL worksheet template identified as G1LJul07.xls using efficiency functions and corrections for casing and dead time as determined from annual calibrations.

**Results and Interpretations:**

No manmade radionuclides were detected in this borehole. Cs-137 was encountered at or near the MDL at several isolated points. These detections are simply statistical fluctuations generated by the routine processing software and are not valid full energy peaks.

Repeat sections acquired for each logging event indicate good repeatability.

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**List of Log Plots:**

Depth Reference is ground surface

Man-made Radionuclides

Natural Gamma Logs

Combination Plot

Total Gamma, & Dead Time

Natural Gamma Repeat Logs (71-96 ft)

Natural Gamma Repeat Logs (246-266 ft)

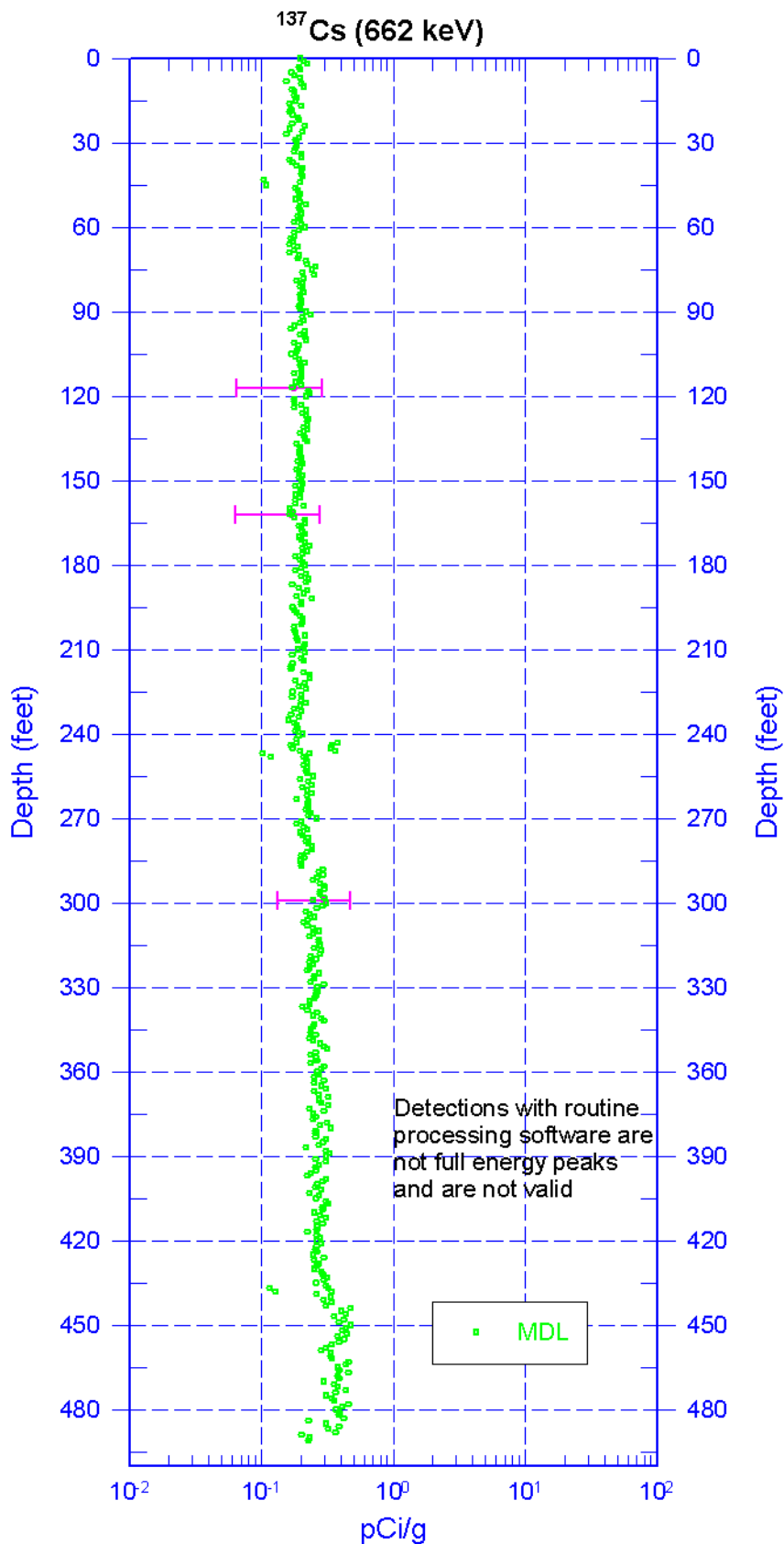
Natural Gamma Repeat Logs (440-445 ft)

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<sup>1</sup> GWL – groundwater level

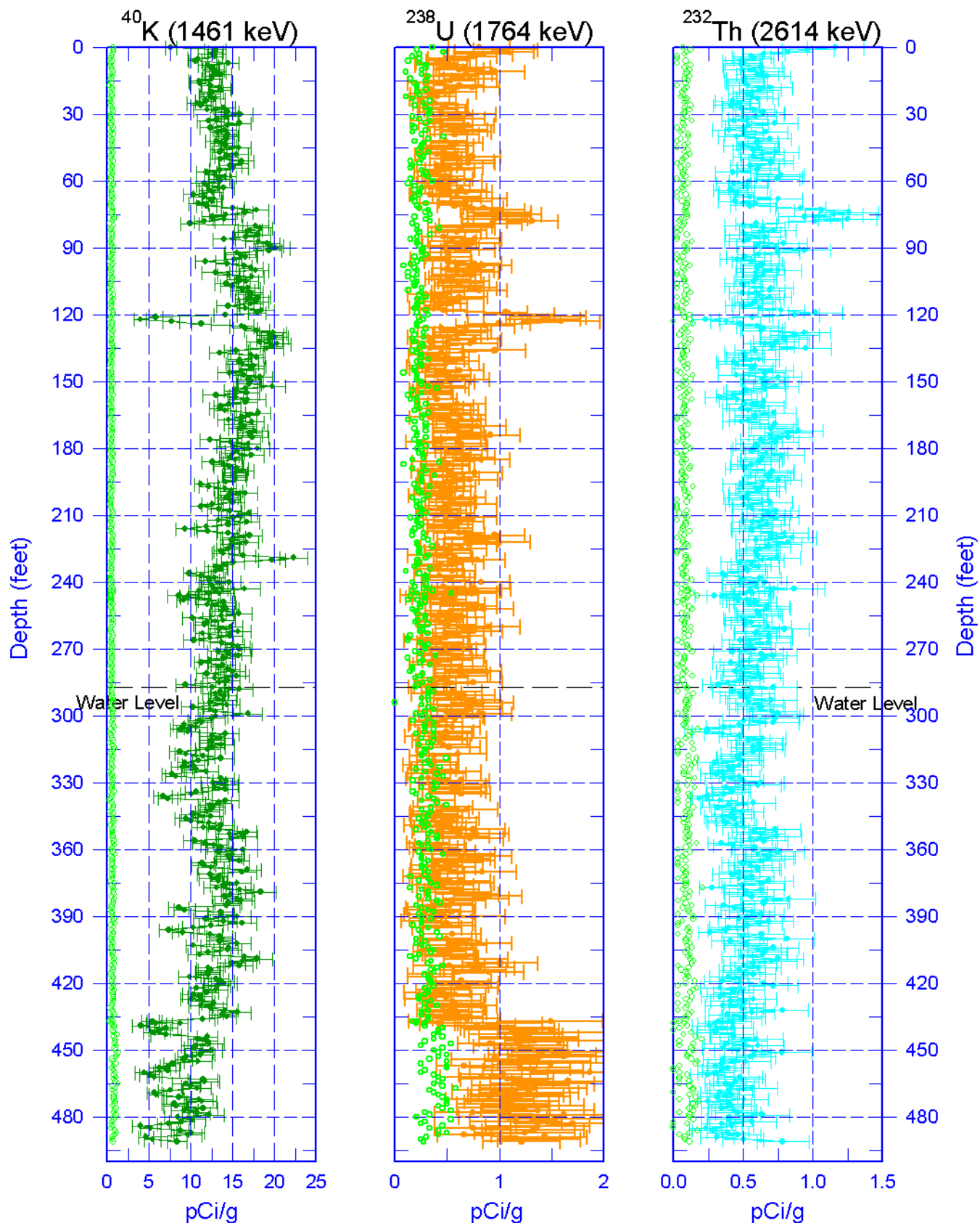
<sup>2</sup> N/A – not available

## 299-W11-88 (C5572) Manmade Radionuclides



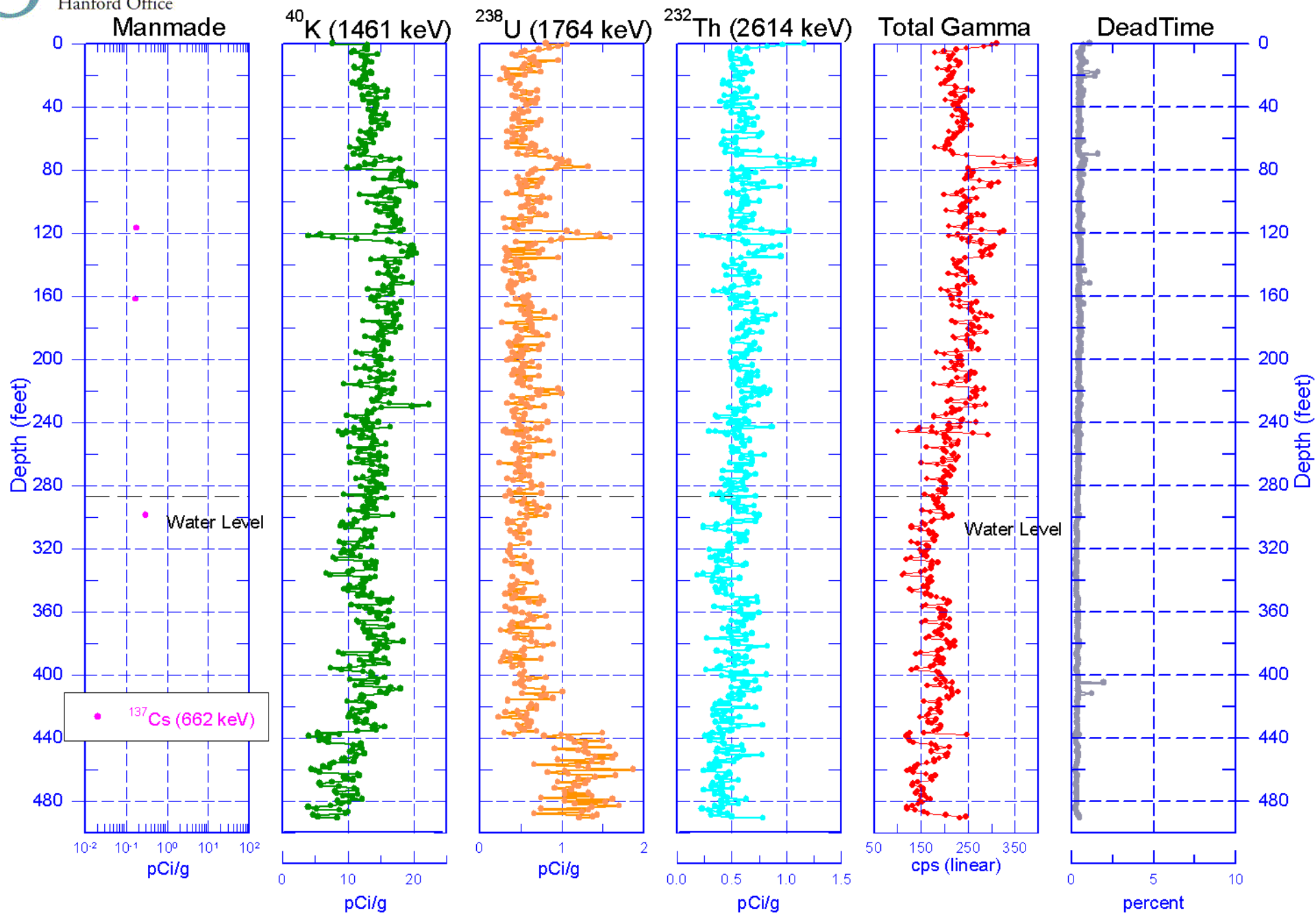
Zero Reference = Ground surface

# 299-W11-88 (C5572) Natural Gamma Logs



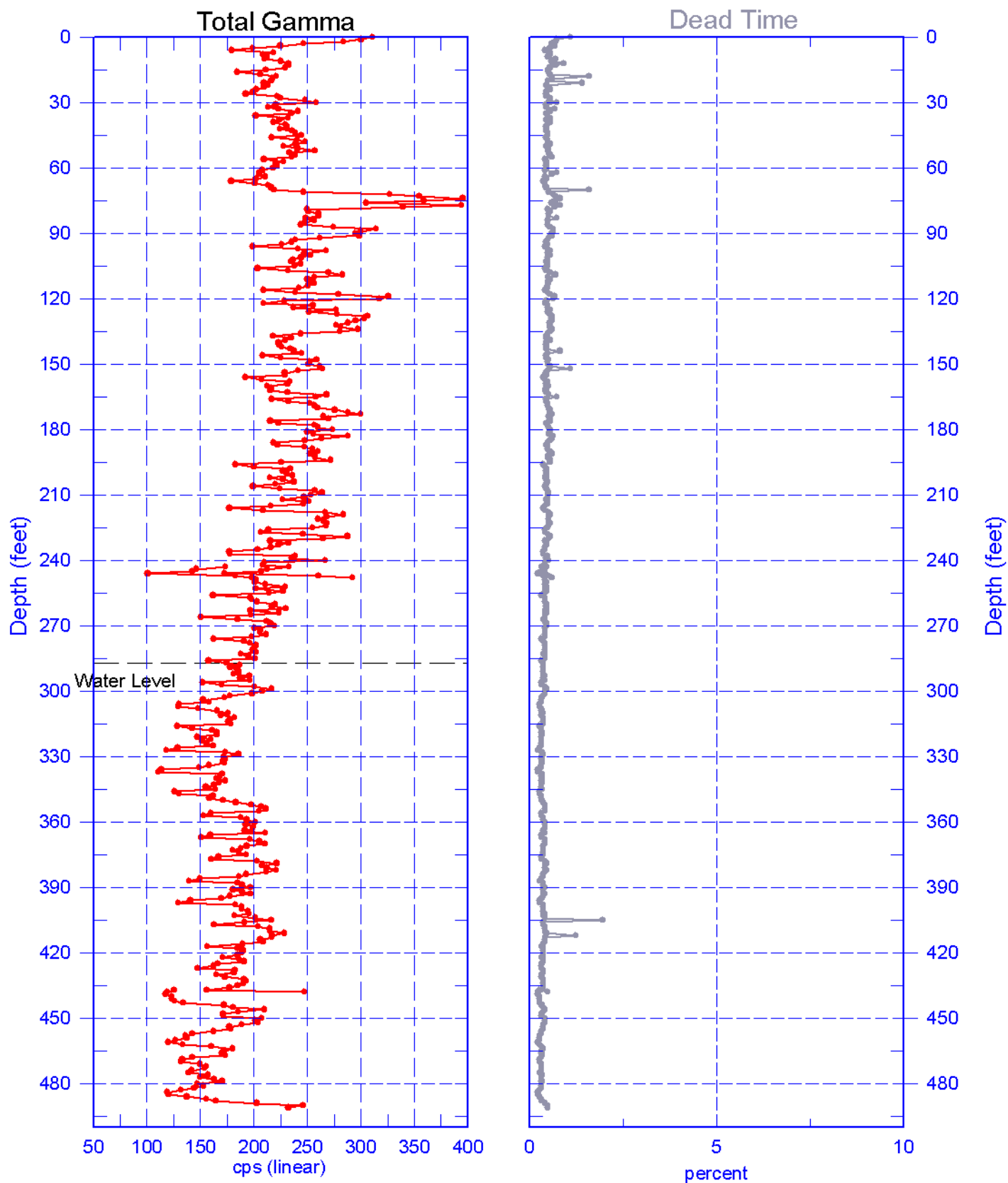
Zero Reference = Ground Surface

# 299-W11-88 (C5572) Combination Plot

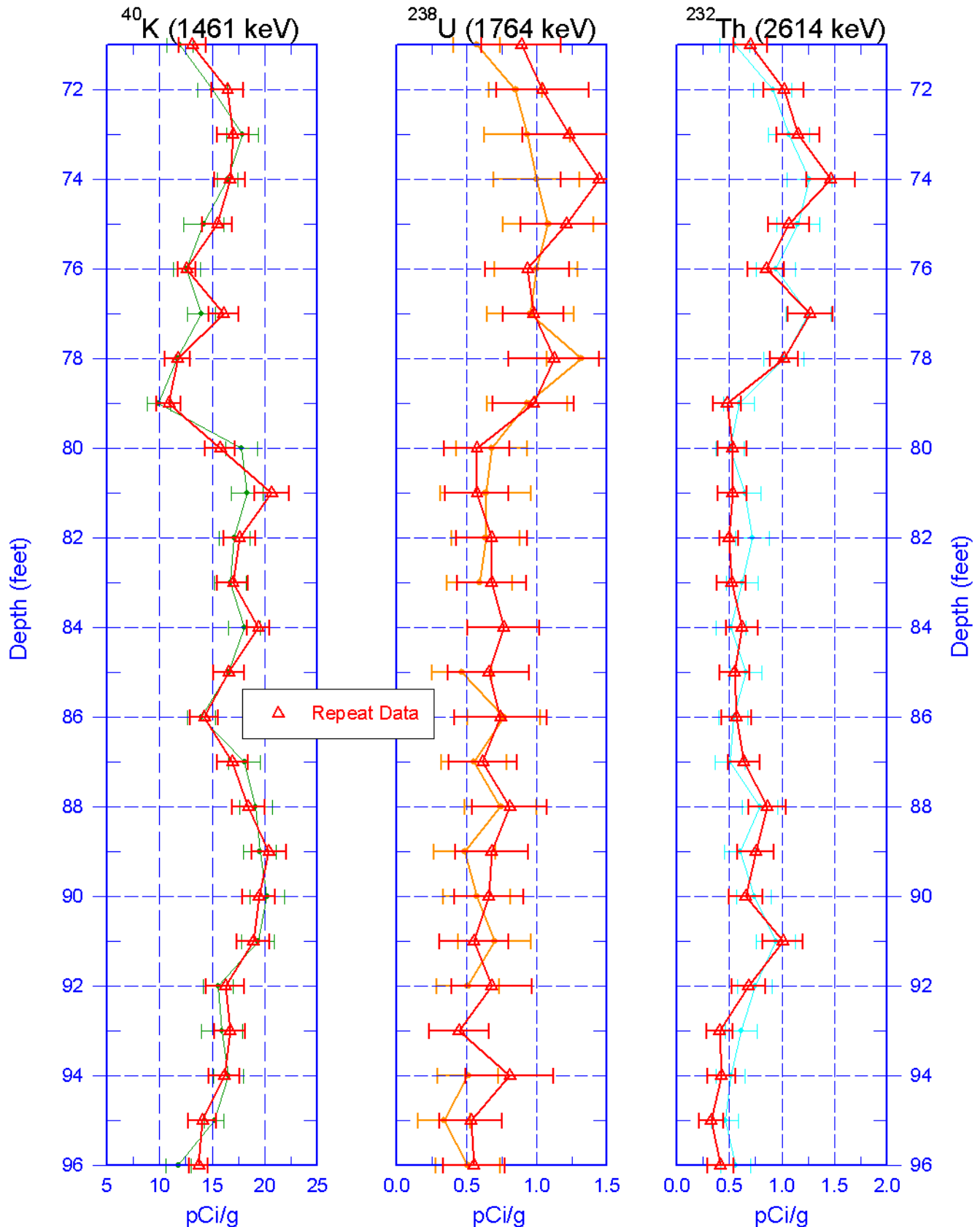


Zero Reference = Ground Surface

## 299-W11-88 (C5572) Total Gamma & Dead Time



# 299-W11-88 (C5572) Natural Gamma Repeat Logs (71-96 ft)

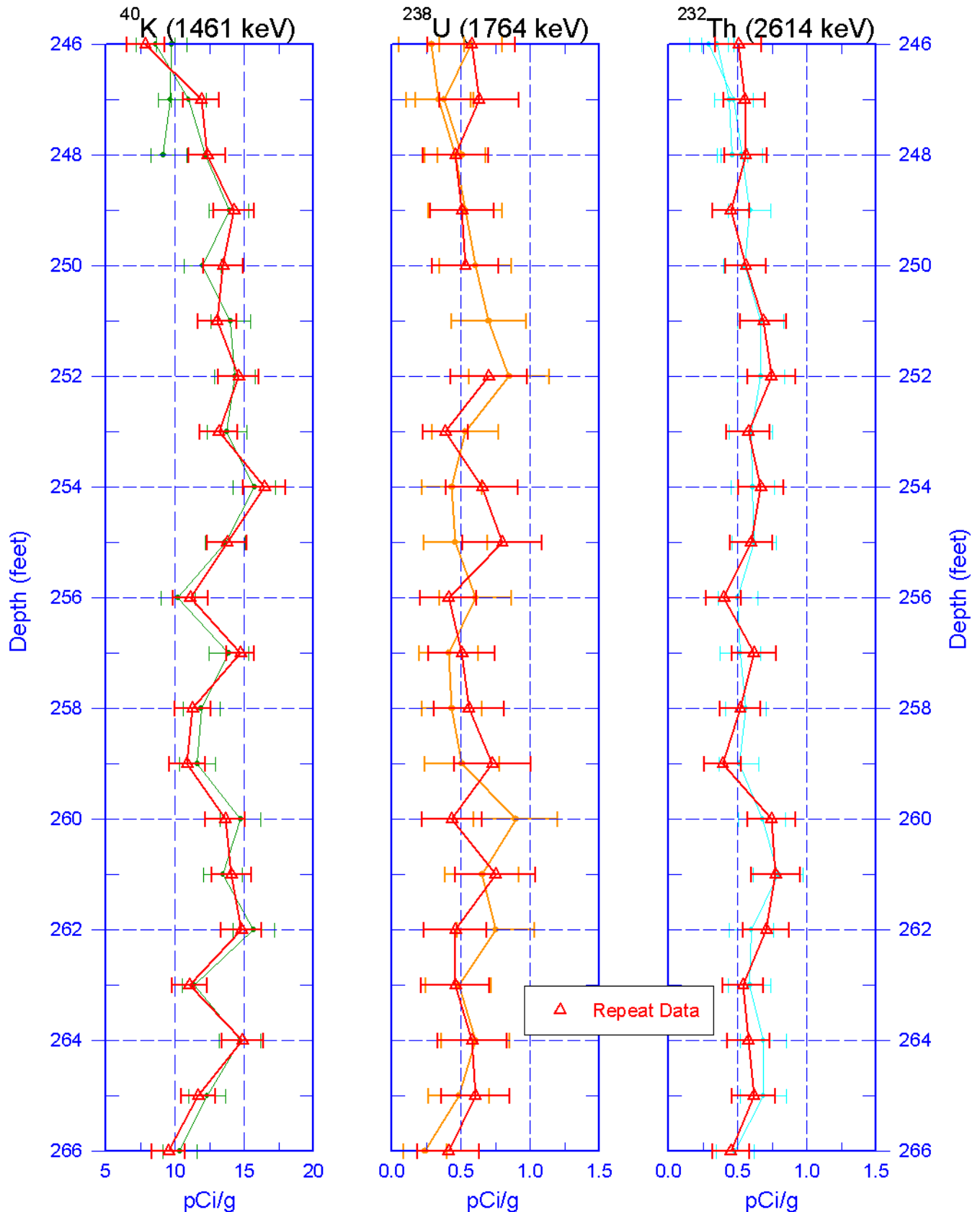


Zero Reference = Ground Surface



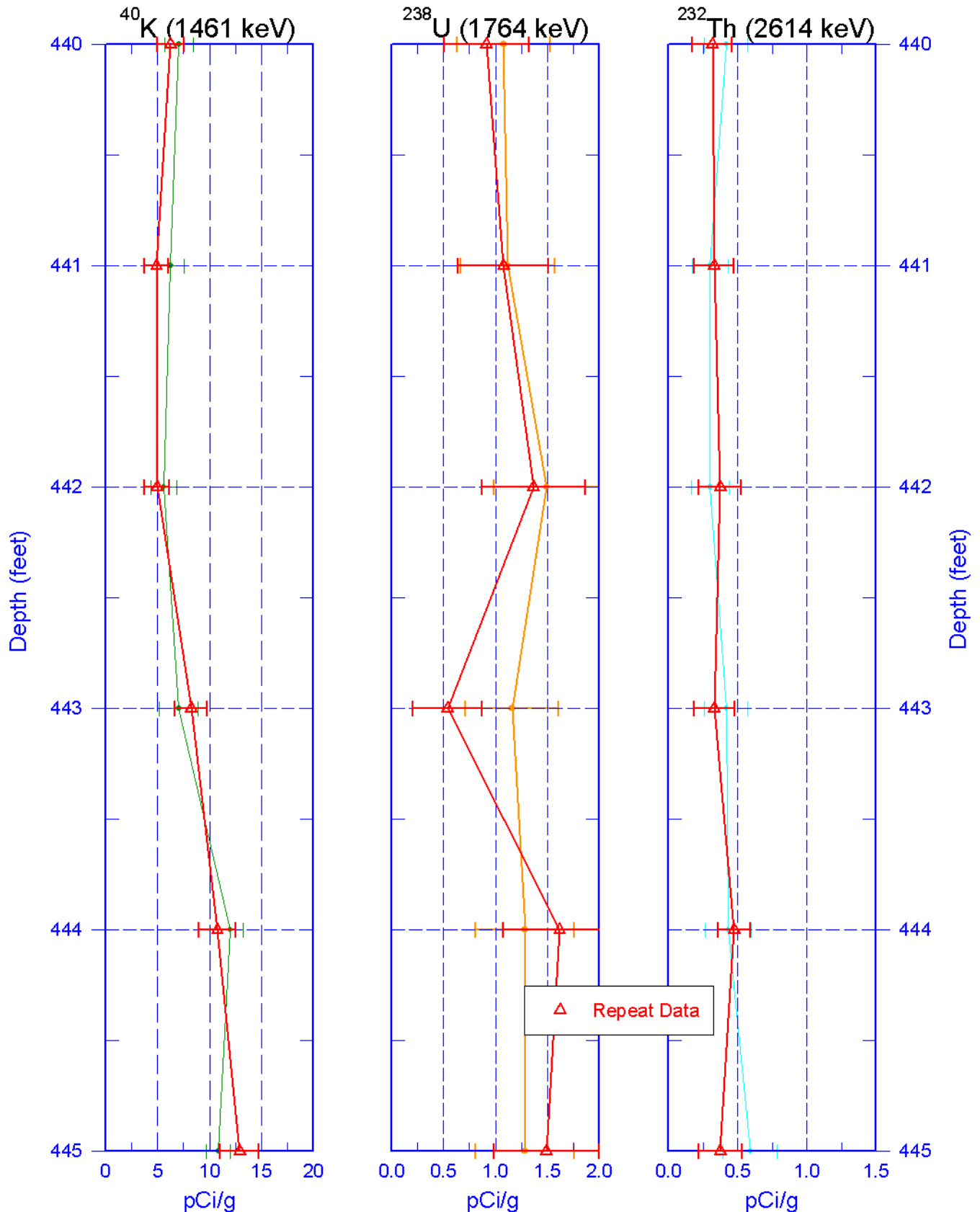
# 299-W11-88 (C5572)

## Natural Gamma Repeat Logs (246-266 ft)



Zero Reference = Ground Surface

# 299-W11-88 (C5572) Natural Gamma Repeat Logs (440-445 ft)



Zero Reference = Ground Surface